I/WE CLAIM:

1. A rocket engine component comprising:

a body including first and second structural layers each comprising at least about 20% of a body thickness,

said first structural layer being formed of a first material selected from the group consisting of NiAl and NiAl-based alloys, and wherein said first material has a first predetermined ductility and a predetermined thermal conductivity, and

said second structural layer being formed of a second material selected from the group consisting of Ni-based superalloys, Co-based alloys, Fe-based alloys, Cu, and Cu-based alloys, wherein said second material is more ductile than said first material.

2. The rocket engine component of claim 1 wherein said predetermined thermal conductivity of said first structural layer is at least about 40W/m K.

3. The rocket engine component of claim 1 wherein said first structural layer has a thickness of at least about 20 mils.

4. The rocket engine component of claim 1 wherein said first material is a NiAl-based alloy having elemental additions of Zr.

5. The rocket engine component of claim 5A wherein said elemental additions of Zr are at a level of up to approximately 0.3 atomic % of the first material.

6. The rocket engine component of claim 1 wherein said first material is a NiAl-based alloy being selected to enhance a predetermined property selected from the group consisting of environmental resistance, thermal conductivity and high temperature strength.

7. The rocket engine component of claim 1 wherein said component is a combustion chamber, a throat, or a nozzle.

8. A rocket engine component comprising:

a body including first and second structural layers each comprising at least about 20% of a body thickness, said first and second structural layers having continuous adjoining surfaces,

said first structural layer being formed of a first material selected from the group consisting of NiAl and NiAl-based alloys, and wherein said first material is associated with a first predetermined ductility and having a thermal conductivity of at least about 40 W/m K, and

said second structural layer being formed of a second material selected from the group consisting of Ni-based superalloys, Co-based alloys, Fe-based alloys, Cu, and Cu-based alloys, wherein said second material is more ductile than said first material and wherein said second material has a thermal conductivity less than said thermal conductivity of said first material.

9. A component for use and exposure within high heat flux and hot gas environments, said component comprising:

a body including first and second structural layers each at least about 20 mils thick and comprising at least about 20% of a body thickness, said first and second structural layers having continuous adjoining surfaces;

said first structural layer having a surface adapted for direct exposure to a heat source or a hot gas, said first structural layer being formed of a first material selected from the group consisting of NiAl and NiAl-based alloys, and wherein said first material is associated with a first predetermined ductility and a predetermined thermal conductivity, and

said second structural layer being formed of a second material selected from the group consisting of Ni-based superalloys, Co-based superalloys, Fe-based superalloys, Cu, and Cu alloys, said second structural layer being generally shielded

from direct exposure to said hot gas by said first structural layer, said second material being associated with a second predetermined ductility, wherein said second material is more ductile than said first material.

10. The component of claim 9 wherein said first material is associated with a first coefficient of thermal conductivity and said second material is associated with a second coefficient of thermal conductivity and wherein said second coefficient of thermal conductivity is less than said first coefficient of thermal conductivity.

11. The component of claim 9 wherein said second material is selected in order to enhance a predetermined property of said component, said predetermined property being selected from the group consisting of environmental resistance, strength, thermal conductivity, ductility, and toughness.

12. The component of claim 11 wherein said predetermined property is environmental resistance.

13. The component of claim 11 wherein said predetermined property is strength.

14. The component of claim 11 wherein said predetermined property is thermal conductivity.

15. The component of claim 11 wherein said predetermined property is toughness.

16. The component of claim 9 further comprising a third structural layer comprising at least about 20% of said body thickness, said third structural layer formed of a third material selected to enhance a predetermined property of said component, said predetermined property being selected from the group consisting of environmental resistance, strength, thermal conductivity, ductility, and toughness.

17. The component of claim 9 wherein said first material is a NiAl-based alloy having additions of the element Zr.

18. The component of claim 17 wherein said Zr additions are at a level of up to approximately 0.3 atomic % of the first material.

19. A component for use and exposure within high heat flux and hot gas environments, said component comprising:

a body including first and second structural layers each comprising at least about 20% of a body thickness, said first and second structural layers having continuous adjoining surfaces,

said first structural layer having a surface adapted for direct exposure to a heat source or a hot gas, said first structural layer being formed of a first material selected from the group consisting of NiAl and NiAl-based alloys, and wherein said first material is associated with a predetermined toughness and a predetermined thermal conductivity; and

said second structural layer being formed of a second material selected from the group consisting of Ni-based superalloys, Co-based superalloys, Fe-based superalloys, Cu, and Cu alloys, said second structural layer being generally shielded from direct exposure to said hot gas by said first structural layer, wherein said second material is associated with a second predetermined toughness, wherein said second material is tougher than said first material.

20. The component of claim 19 wherein said first material comprises a NiAl-based alloy comprising at least about 95% volume percent of a B2-ordered compound phase.